Validity and reliability study of the pediatric Rome III questionnaire for Turkish children and adolescents

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Funda Özgenç[1], Aybüke Akaslan Kara[2], Nilüfer Demiral Yılmaz[3], Şerife Şebnem Önen[2], Tuncay Öğretmen[4], Çiğdem Ömür Ecevit[5], Süleyman Ayhan Çalışkan[3]

[1]Department of Pediatric Gastroenterology, Hepatology and Nutrition, Ege University School of Medicine, İzmir, Turkey
[2]Department of Pediatrics, Ege University School of Medicine, İzmir, Turkey
[3]Department of Medical Education, Ege University School of Medicine, İzmir, Turkey
[4]Department of Measurement and Evaluation, Ege University School of Educational Science, İzmir, Turkey
[5]Department of Pediatric Gastroenterology, Hepatology, and Nutrition, Behçet Uz Children's Hospital, İzmir, Turkey

Original Article

ABSTRACT

Background/Aims: Questionnaire on Pediatric Gastrointestinal Symptoms: Rome III version (QPGS-RIII), originally developed in English, was adapted to different languages in order to widen its use. The aim of this study was to evaluate the validity and reliability of a questionnaire on the Pediatric QPGS-RIII parent-report form for children and self-report form for children and adolescents, which has been adapted into Turkish.

Materials and Methods: The study group comprised 7–18-year-old children/adolescents (n=690) who presented to Ege University School of Medicine, Department of Child Health and Diseases outpatient clinic. In the study, the validity and reliability of the QPGS-RIII Turkish version of the questionnaire was established.

Results: Confirmatory factor analysis (CFA) resulted in a 10-factor model satisfactory construct for the validity and in acceptable indices of goodness of fit. Standardized coefficients determined with CFA in the Turkish version of the instrument ranged between 0.15 and 0.87 in the 7–9-year-old children and between 0.13 and 0.98 in the 10–18-year-old children/adolescents. t-values of all the factor loadings were significant. In addition, the test-retest analyses were above 0.70, except for the abdominal migraine factor.

Conclusion: Findings relating to the validity and reliability of the study indicated that the Turkish version of the instrument could be adequately used to assess functional gastrointestinal disorders (FGIDs) in Turkish children and adolescents. The Turkish version of the instrument is therefore recommended to be used in epidemiologic studies and in clinical trials to be conducted in a Turkish-speaking population.

Keywords: Functional gastrointestinal disorders in pediatrics , questionnaire on pediatric gastrointestinal symptoms, Rome III criteria

INTRODUCTION

Functional gastrointestinal disorders (FGIDs) constitute a group of various types of abdominal symptoms, and their actual incidence is likely to be higher than that determined in clinical practices. Because no underlying organic cause has been found by evolutionary work-up, a symptom-based approach, namely the Rome criteria, was designed in order to better diagnose FGIDs without exclusionary testing (1).

Diagnostic criteria of FGIDs in adults were first published in 1990 as Rome I criteria (2). To diagnose these diseases in children, a commission gathered in Rome for the first time in 1997, and the conclusions from this

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meeting were published in 1999 as Rome II criteria (3). Over time, the criteria were considered inadequate in some cases and further commissions were established to re-evaluate these criteria, whereby changes were made and finally new criteria were published in 2006 called the Rome III diagnostic criteria. Pediatric FGIDs were revised by the Rome III Child and Adolescent Committee and were called the Pediatric Rome III criteria (4-6). Then, the Rome III Child and Adolescent Committee and the Rome III Questionnaire Committee adapted the Questionnaire on Pediatric Gastrointestinal Symptoms (QPGS) and developed the Questionnaire on Pediatric Gastrointestinal Symptoms-Rome III version (QPGS-RIII). The diagnostic questionnaire, originally developed in English, was adapted to different languages in order to use it in epidemiologic studies and clinical trials (7). To date, no language adaptation study of the diagnostic questionnaire has been conducted in order to use it in a Turkish-speaking population.

When an instrument is developed or adapted to a different language, its validity and reliability should be established because specific studies may require a comprehensive linguistic translation process, but this still does not ensure construct validity and reliability (8,9). If an instrument developed in one culture is to be used in another culture correctly, establishment of its validity and reliability in the new culture is a prerequisite.

The aim of the current study was to evaluate the validity and reliability of the Questionnaire on Pediatric Gastrointestinal Symptoms, Rome III version (QPGS-RIII) parent-report form for children (4 years of age and older) and self-report form for children and adolescents (10 years of age and older), which has been adapted into Turkish.

MATERIALS AND METHODS

Participants
The study group comprises 7–18-year-old children/adolescents who presented to Ege University School of Medicine, Department of Child Health and Diseases outpatient clinic. The study was conducted with 690 asymptomatic participants who agreed to participate in the study and who were selected with a convenience sample technique. The target sample size for both age groups was determined to be over 300 according to the rule of a minumum total sample size of 500 for the factor analysis (10).

Original instrument
The Questionnaire on Pediatric Gastrointestinal Symptoms-Rome III version (QPGS-RIII) is an adaptation and abbreviation of the Questionnaire on Pediatric Gastrointestinal Symptoms (QPGS) on the basis of the Pediatric Rome II crietria. Although the format and many items from the original QPGS have been retained, several new items have been included and the scoring has been revised to reflect changes in the symptom criteria based on Rome III (11,12).

QPGS-RIII items are grouped into five sections. The items included in these sections comprise the following 10 categories: functional dyspepsia, irritable bowel syndrome, abdominal migraine, functional abdominal pain, functional abdominal pain syndrome, functional constipation, nonretentive fecal incontinence, aerophagia, cyclic vomiting syndrome, and rumination syndrome. The questionnaire uses 5-point scales to measure frequency, severity, and duration of the symptoms.

The parent-report version of the QPGS-RIII is suitable for use by the parents of children four years of age and older. The self-report version is suitable for administration to children ten years of age and older and is preferable to the parent-report version when parents have limited knowledge of their children's symptoms (11,13).

Validity and reliability study of the instrument
The Questionnaire on Pediatric Gastrointestinal Symptoms, Rome III version (QPGS-RIII) parent-report form for children (4 years of age and older) and self-report form for children and adolescents (10 years of age and older) was adapted in four stages. While the validity analysis (language, content, and construct) was performed in the first three stages, the reliability analysis was performed in the fourth stage. The stages related to the validity and reliability study of the instrument are given in Figure 1.

1. Adaptation of the original instrument to Turkish
In stage 1, the language validity of the instrument was examined. In order to adapt the original instrument into Turkish, first, the necessary permission was obtained from the Rome Foundation. The adaptation process of the original instrument was based on the guidelines established by the Rome Foundation material (14). To translate the instrument, the following steps were performed: forward translation, reconciliation, back-translation, and comparison of the original instrument with its back-translated versions.

Forward translation: During the step of the adaptation process, two physicians who had a good command of English translated the original instrument into Turkish independently of each other.
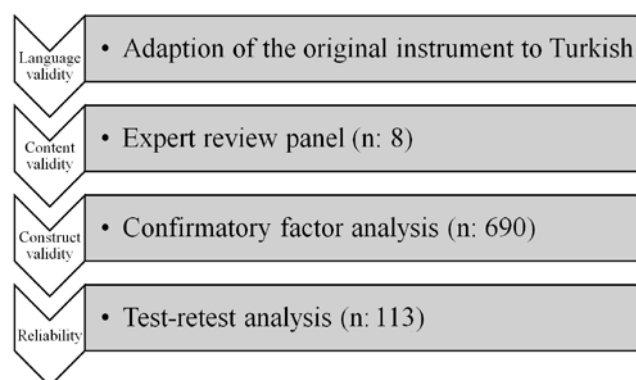

Figure 1. Stages related to the validity and reliability study of the instrument.

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Reconciliation: In this step, both the translators and researchers compared the forward version of the instrument with the original instrument and agreed a compromise on the final text.

Back-translation: The forward version of the instrument was translated back to English from Turkish by an expert translator who had a good command of both Turkish and English languages. As a result, the control of the instrument was completed by the expert review panel.

Comparison of the original and back-translated versions for the scale and validation of the translation: After the back-translation step, the original and back-translated versions of the instrument were re-evaluated. At this step, the backward version was compared with the original instrument in order to find out whether there were any differences between the instrument in terms of meaning and concept coherence. After the necessary corrections were made, the instrument took its final target language version.

The final target language version of the instrument was evaluated by a linguist specialized in Turkish Language and Literature to find out whether the text of the instrument was consistent with the structure and rules of Turkish language. The linguist then made revisions where necessary.

All steps in the translation were documented and these were submitted to the Rome Foundation. After the translation process was completed, the Turkish version of the instrument was approved by the Rome Foundation.

2. Expert review panel
In stage 2, the content validity of the Turkish version of the instrument was examined. In order to determine the content validity of the instrument, eight experts who worked in different Pediatric Gastroenterology, Hepatology, and Nutrition departments were consulted. All the experts were physicians from three different medical schools. The experts were asked to evaluate the items included in the instrument based on certain criteria (whether the item represents the property to be measured, whether the item can be understood by the target population, whether the statements are clear enough) by using a standard form. The experts evaluated each item of the Turkish version of the instrument as 'appropriate' or 'not appropriate' and then offered suggestions for the items they considered 'not appropriate' (15). Based on expert opinion, the Content Validity Ratio (CVR) for each of the items in the instrument was calculated using the Lawshe technique. In the Lawshe technique, if the number of experts is 8, the CVR is expected to be a minimum 0.78 at the $\alpha=0.05$ level of significance (16,17).

Pretesting and implementation
Another section on the participants' demographic characteristics, such as age, gender, number of children in the family, parents' education levels, and family's income level, were add-

ed to the Turkish version of the instrument. Then, the instrument was tried out on participant volunteers (n=20 children and n=20 parents). The participant volunteers evaluated the items in the instrument in terms of meaningfulness, readability, comprehensibleness, sentence length, clearness, and clarity of the meaning. Feedback from participants was reviewed by the investigators. After it was pretested, the Turkish version of the instrument was ready to be implemented.

The Turkish version of the instrument was handed out to the participants included in the survey between December 2010 and June 2012. Prior to the application of the instrument, the participants were informed about the purpose of the study and the confidentiality of their personal data, and then their consents were obtained. The items in the instrument were responded to by the parents if the children were in the 7-9-age group. If the children were between the ages of 10 and 18, they answered the items themselves. Each instrument was completed in about 30 minutes through face-to-face interviews. The interviews were held by A.A.K. and Ş.Ş.Ö, both physicians in the general pediatric fellowship program.

3. Factor analysis
In stage 3, the construct validity of the Turkish version of the instrument was examined. The construct validity of the instrument was examined with confirmatory factor analysis (CFA). In order to determine the construct validity of the instrument, a ten-factor model was established, which was similar to that of the original instrument: functional dyspepsia, irritable bowel syndrome, abdominal migraine, functional abdominal pain, functional abdominal pain syndrome, functional constipation, nonretentive fecal incontinence, aerophagia, cyclic vomiting syndrome, and rumination syndrome, and then the model was tested by CFA.

4. Reliability analysis
In stage 4, the reliability analysis of the Turkish version of the instrument was performed. To determine the reliability of the instrument, a test-retest analysis was used and the Pearson correlation coefficient was calculated. The Turkish version of the instrument was applied to the parents of 65 children aged 7-9 and to 48 children/adolescents themselves between the ages of 10-18. The instrument was reapplied within two weeks by interviewing the children/adolescents and parents, who were randomly selected (18). The cut-off point for the reliability coefficient was accepted as 0.70 (19).

At the end of the four stages, the validity and reliability of the Turkish version of the instrument were established.

Data analysis
Data quality control was performed. To ensure validity and to determine the best factor structure of the QPGS-RIII in the Turkish version of the questionnaire, a confirmatory factor analy-

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sis (CFA) was conducted. The CFA procedure with maximum likelihood estimates, and the goodness-of-fit of the model was evaluated by multiple criteria. Reliability of the Turkish version was assessed by test-retest analysis. The statistical analysis was performed using PASW statistics for Windows (SPSS Inc.; Chicago, IL, USA) version 18.0 and LİSREL 8.80 programs.

Ethical considerations
The study was approved by the Ethics Committee of Ege University School of Medicine. Written and verbal consents were obtained from the participants and their parents.

RESULTS

Characteristics of the study group
Of the 690 children/adolescents who responded to the Turkish version of the instrument in the study group, 43.48% (300) were between the ages of 7 and 9 and 56.52% (390) were between the ages of 10 and 18. The mean age was 8.24; SD=1.09 (min: 7, max: 9) for the children in the 7–9-year-old age group and 13.37; SD=2.23 (min: 10, max: 18) for the children/adolescents in the 10–18-year-old age group.

The number of the children with abdominal migraine in the 7–9-year-old age group and in the 10–18-year-old age group was 27 and 134, respectively. The number of the children with nonretentive fecal incontinence in the 7–9-year-old age group and in the 10–18-year-old age group was 105 and 89, respectively. Forty-three children in the 7–9-year-old age group and 90 children in the 10–18-year-old age group were positive for cyclic vomiting syndrome, whereas the numbers for the positive ones for the rumination syndrome were 86 and 121, respectively. The demographic characteristics of the study group are given in Table 1.

1. Adaptation of the original instrument to Turkish
During the adaptation of the Questionnaire on Pediatric Gastrointestinal Symptoms, Rome III version (QPGS-RIII) parent-report form children and self-report form for children and adolescents into Turkish, the final target language version of the instrument was developed with the items agreed in terms of concepts and language equivalence. All items of the original instrument were translated into Turkish without any problem. Also, there was no difference between the original and the translated versions.

2. Expert review panel
The Turkish version of the instrument was adapted with the items with a calculated CVR score over 0.78. It was found that each item of the Turkish version of the instrument had a CVR over 0.78; thus, no changes were made on the instrument.

Pretesting
The Turkish version of the instrument was pretested on 20 children and 20 parents who had volunteered to participate in the study. Participants stated that the items of the instrument were meaningful, readable, and understandable.

3. Factor analysis
In order to determine the construct validity of the Turkish version of the instrument, a 10-factor model was established, which was similar to that of the original instrument: functional dyspepsia, irritable bowel syndrome, abdominal migraine, functional abdominal pain, functional abdominal pain syndrome, functional constipation, nonretentive fecal incontinence, aerophagia, cyclic vomiting syndrome, and rumination syndrome, and then the model was tested by CFA. Goodness-of-fit indices of the tested model obtained from the CFA are given in Table 2.

Table 1. Demographic characteristics of the study group

		Parent-Report Form (4 years and older) n=300		Self-Report Form (10 years and older) n=390	
Child's gender	Female	183	61.0%	194	49.7%
	Male	117	39.0%	196	50.3%
Number of the children in the family	1	66	22.0%	96	24.6%
	2	145	48.0%	175	44.9%
	3 or more	89	30.0%	119	30.5%
Parent's education	Elementary school	238	40.0%	446	57.2%
	High school	240	40.0%	219	28.1%
	University	122	20.0%	115	14.7%
Family's socioeconomic status	Lower class	134	44.0%	139	35.6%
	Middle class	133	44.0%	211	54.2%
	Upper class	33	12.0%	40	10.2%

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Standardized coefficients determined with CFA in the Turkish version of the instrument ranged between 0.15 and 0.87 in the 7–9-year-old children and between 0.13 and 0.98 in the 10–18-year-old children/adolescents. t-values of all the factor loadings were significant. Standardized coefficients (R^2) of the Turkish version of the instrument are presented in Table 3.

The standardized coefficients of the factors determined through the CFA were higher than 0.30. The standardized coefficients of some items of the three factors (functional constipation, aerophagia, rumination syndrome) determined through the CFA were lower than 0.30.

4. Reliability analysis

To establish the reliability of the Turkish version of the instrument, test-retest analysis was employed. In Table 4, test-retest correlation coefficients (r) of the factors are given.

Test-retest correlation coefficients of the factors ranged between 0.58 and 0.97. While the reliability value of the abdominal migraine factor was determined to be moderate, the reliability values of the other factors were determined to be high. Based on the results of the analysis, the Turkish version of the instrument was considered stable.

DISCUSSION

In this study, the Questionnaire on Pediatric Gastrointestinal Symptoms, Rome III version (QPGS-RIII) developed to determine gastrointestinal symptoms was adapted into Turkish, and then the validity and reliability of the adapted instrument was established. In this study, the steps recommended by Gjersing et al. (8) and Sousa and Rojjanasrirat (20) during the adaptation of the original instrument were used. Psychometric properties of the adapted-instrument were evaluated in accordance with the validity evidence sources recommended by The American Psychological, Education Research Associations and National Council on Measurement in Education (AERA-APA-NCMA 1999) (21).

For the language validity of the Turkish version of the instrument, the translation process was performed according to guidelines (14). After the translation process was completed, it was seen that the items in the translated instrument corresponded to the items in the original instrument. Von Reisswitz et al. (22), Lee et al. (23), and Song et al. (24) obtained similar findings in their study. The concept and language validity of the instrument was supported with its adaptation into Turkish.

In this study, the content validity of the Turkish version of the instrument was established with the evidence obtained from expert opinions. This stage involved collecting data from content experts to establish that the individual survey items were relevant to the construct being measured and that key items or indicators had not been omitted (9). Content validity ratios based on the experts' opinion indicated that all the items in

Table 2. Goodness-of-fit indices of the Turkish version of the instrument

	n	χ^2	RMSEA	S-RMR	CFI	GFI	AGFI
Parent-Report Form (4 years and older)	300	2732.49 $_{(850)}$; p=0.00	0.08*	0.06	1.00	0.97	0.97
Self-Report Form (10 years and older)	390	3487.12 $_{(850)}$; p=0.00	0.08*	0.07	1.00	0.97	0.96

*p<0.05

Table 3. Standardized coefficients (R2) of the Turkish version of the instrument

Factors (Categories of FGIDs)	Parent-Report Form (4 years and older) R^2	Self-Report Form (10 years and older) R^2
Functional Dyspepsia	0.45–0.65	0.36–0.51
Irritable Bowel Syndrome	0.51–0.87	0.38–0.87
Abdominal Migraine	0.74–0.83	0.39–0.61
Functional Abdominal Pain	0.61–0.87	0.51–0.87
Functional Abdominal Pain Syndrome	0.45–0.87	0.50–0.87
Functional Constipation	0.15–0.70	0.13–0.55
Nonretentive Fecal Incontinence	0.70–0.84	0.55–0.82
Aerophagia	0.16–0.65	0.13–0.40
Cyclic Vomiting Syndrome	0.59–0.79	0.32–0.73
Rumination Syndrome	0.22–0.80	0.15–0.98

Table 4. Test-retest analysis

Factors (Categories of FGIDs)	Parent-Report Form (4 years and older) n=65 r	Self-Report Form (10 years and older) n=48 r
Functional Dyspepsia	0.96	0.86
Irritable Bowel Syndrome	0.97	0.99
Abdominal Migraine	0.58*	0.99
Functional Abdominal Pain	0.97	0.98
Functional Abdominal Pain Syndrome	0.92	0.99
Functional Constipation	0.77	0.99
Nonretentive Fecal Incontinence	0.97	0.99
Aerophagia	0.87	0.91
Cyclic Vomiting Syndrome	0.78	0.97
Rumination Syndrome	0.82	0.96

*p>0.05

the instrument were in compliance with the measurement purpose.

Construct validity of the Turkish version of the instrument was established with confirmatory factor analysis (CFA). In the literature, it is indicated that the chi-square value cannot be

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used as a formal test because it is sensitive to the sample size. In this case, the ratio of chi square (χ^2) to its degrees of freedom (df) can be used as a sufficiency criterion. If this value is 5 or less, it indicates that the model has an acceptable goodness-of-fit (25-28). According to the findings of CFA, the χ^2/df rate for each of the two age groups below 5 indicates that the model's adaptation value was at the mid-level. However, the χ^2 statistic alone is insufficient to test the suitability of the model; therefore, it was recommended to use Root Mean Square Error of Approximate (RMSEA), Comparative Fit Index (CFI), and Goodness-of-Fit Index (GFI) criteria for the evaluation as well (26,29). According to Kline (28), Brown (30), Steiger (31), and Hooper et al. (32), an RMSEA value between 0.05 and 0.08 indicates a good fit. The standardized RMR value less than 0.10 indicates an acceptable fit. According to Thompson (33) and Hooper et al. (32), if the CFI, GFI, and AGFI coefficients are greater than 0.95, there is a perfect fit between the model and the data. Goodness-of-fit indices obtained in this study indicated that the model-data adaptation of the tested model was established. It was determined that the adapted Turkish instrument used within this research had a 10-factor construct just as the original instrument had. The results of the construct validity of the Turkish version of the instrument were thus considered appropriate.

For the reliability study of the Turkish version of the instrument, the test-retest method was used. According to Kline (19), the reliability coefficient of a test determined by this method should be at least 0.70 (18). Here, the correlation coefficients of the factors determined through the test-retest analysis were above 0.70, except for the abdominal migraine factor. The correlation coefficient of the abdominal migraine factor was found to be 0.58 in the 7–9-year-old children. This value refers to a moderate association. Caplan et al. (34), Helgeland et al. (12), and Van Tilburg et al. (35) obtained similar findings in their study. This may be explained as parents may have limited knowledge of their children's gastrointestinal symptoms, and the reliability of their answers may therefore be questionable.

The fact that the study sample is large, the demographic characteristics of the participants were homogeneous, the relevant methodology was implemented during the translation and adaptation process, and that the validity evidence sources criteria (AERA-APA-NCMA 1999) were taken into account are the strengths of this study. That the study was conducted only with the participants who were admitted to one hospital is the limitation of this study.

In conclusion, this study was aimed at evaluating the reliability and validity of the Turkish version of the Questionnaire on Pediatric Gastrointestinal Symptoms-Rome III (QPGS-RIII). Findings relating to the validity (language, content, and construct) and reliability of the study indicated that the Turkish version of the instrument could be adequately used to assess functional gastrointestinal disorders (FGIDs) in Turkish children and adolescents. The Turkish version of the instrument is thus recommended to be used in epidemiologic studies and clinical trials to be conducted in a Turkish-speaking population.

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